1.0.7 DATA ASSESSMENT PROCEDURES
Sections 1.0.7.1 Through 1.0.7.6 Apply to Criteria Pollutants

1.0.7.1 RESPONSIBILITY - Within the ARB reporting organization, the Quality Assurance Section (QAS) schedules and conducts performance audits and calculates and reports air quality data accuracy. The Environmental Protection Agency's (U.S. EPA) 40 CFR Part 58 contains criteria and requirements for ambient air quality monitoring and for reporting ambient air quality data and information.

The QAS staff also develops procedures and compiles precision data. Operating agency monitoring personnel perform the precision tests and report the data to the QAS within 60 days after the end of the calendar quarter. Some precision data reported by monitoring personnel, such as from Dasibi Cal II sites, are already in reduced format by site. QAS staff incorporate all precision data and reports it quarterly to the U.S. EPA.

1.0.7.2 SCOPE - QAS staff estimates the air quality data accuracy for each gaseous criteria pollutant using results from analyzer performance audits. Staff conducts performance audits by challenging an analyzer with a gas of known concentration at each level falling within the analyzer's measurement range. TSP and PM10 are audited by a measurement of flow rate and accuracy determined from the deviation from true value. The prescribed U.S. EPA audit levels are:

	Concentration Range, PPM		Flow Rate Range, CFM		
Audit Level	NO2, SO2, O3, H2S	CO	TSP	PM10	PM2.5
1	0.03-0.08	3-8	39.0-60.0	36.0-44.0	15.84-17.5
2	0.15-0.20	15-20			
3	0.35-0.45	35-45			
4*	0.80-0.90	80-90			

*Audit level 4 is generally not required at ARB sites due to analyzer range limitations or low ambient concentrations encountered. A waiver has been received from U.S. EPA indicating ARB does not need to run this level for stations that do not report ambient levels at this range.

Air Monitoring staff obtains air quality precision data for each gaseous criteria pollutant using results from single point precision tests performed at least five times each week on each automated analyzer. Monitoring personnel perform the precision tests by challenging the analyzer with a precision test gas of known concentration between 0.08 and .10 ppm for SO2, NO2, and O3 analyzers and between 8.0 and 10.0 ppm for CO analyzers.

Staff estimates air quality data precision for TSP, PM10, and PM2.5 measurements using results from collocated samplers operated at selected sites. At least three sites are selected based on the highest expected geometric mean concentration. Additional sites may also be selected. The collocated samplers are operated whenever routine sampling is scheduled (i.e., every six days).

1.0.7.3 AIR QUALITY DATA ACCURACY ASSESSMENT REPORT - QAS staff prepares data accuracy assessment reports. A general description of each report follows. Example formats are shown in Figures 1.0.7.1 and 1.0.7.2.

1. ARB Preliminary Audit Report (Figure 1.0.7.1) - After a performance audit, staff prepares the preliminary audit report. The report provides rapid feedback on analyzer status and can serve as a corrective action flag to the operating agency. A copy of this report is given to the station operator at the completion of each through-the-probe audit.

2. ARB Final Audit Report (Figure 1.0.7.2) - Each year following the fourth quarter, staff estimates and reports data accuracy. The report presents the pooled average data accuracy by pollutant, audit concentration level, and by site. A copy of this report is sent to the Chief of the MLD.

3. U.S. EPA Data Accuracy Assessment Report - As required by 40 CFR Part 58, staff prepares the quarterly and annual EPA Data Accuracy Assessment Report in the form of magnetic disk that is sent to the U.S. EPA Region IX QA Coordinator within 100 days after the end of each calendar quarter.

4. Toxics Through-the-Probe Audit Report (Figure 1.0.7.3) - After a field audit

and laboratory analysis of the canister compounds, staff issues a report comparing the lab measured value with the true value of each compound. This report is sent to the Chief of the Northern Laboratory Branch and the appropriate air monitoring section manager.

1.0.7.4 DEFINITION OF STATISTICAL PARAMETERS FOR ACCURACY

1. Quarterly/Annual Accuracy Report - By site (Figure 1.0.7.2, pp. 23-24).

Average Percent Difference (d_j) - An individual analyzer's data accuracy estimate, determined by averaging all the individual percent differences (d_i) for all audit test levels, for a single analyzer.

Mathematically:

$$d_j = 1/n \sum_{i=1}^{n} d_i, \text{ where } d_i = \frac{Y_i - X_i}{X_i} \times 100$$

Y_i = analyzer's net indicated response, ppm, or indicated flow rate (TSP, PM10, Pb audits)

X_i = known concentration of audit test gas, ppm, or known flow rate (TSP, PM10, Pb audits)

n = number of audit test levels

Standard Deviation (S_j) - A measure of the variability of the single analyzer individual percent differences (d_j) for all audit test levels.

Mathematically:

$$Sj = \sqrt{1/(n-1) \sum_{i=1}^{n} d_i^2 - 1/n \left(\sum_{i=1}^{n} d_i\right)^2}$$

NOTE: Computation of S_j is not possible for manual methods that have only one audit test level and a single audit.

95 Percent Probability Limits - A measure of the upper and lower probability limits (UPL & LPL), of which one would expect to find 95 percent of all the single analyzer individual percent differences for all audit test levels, at a single site.

Mathematically for automated analyzers:

$$UPL_j = d_j + 1.96\ S_j$$
$$LPL_j = d_j - 1.96\ S_j$$

Mathematically for manual methods (i.e. PM10, TSP, Pb):

$$UPL = d_j + 1.96\ S_j / \sqrt{2}$$
$$LPL = d_j - 1.96\ S_j / \sqrt{2}$$

Best Fit Linear Regression - An equation that best represents an analyzer's response when a known amount of audit test gas, ppm, or known flow rate (TSP, PM10, Pb audits) is given to the analyzer.

Mathematically:

$$Y = a + bX$$

$$a = 1/n \sum_{i=1}^{n} Y_i - b \sum_{i=1}^{n} X_i$$

$$b = \frac{\sum_{i=1}^{n} X_i Y_i - (1/n) \sum_{i=1}^{n} X_i \sum_{i=1}^{n} Y_i}{\sum_{i=1}^{n} X_i^2 - (1/n) \sum_{i=1}^{n} X_i^2}$$

2. Quarterly/Annual Accuracy Report - By Pollutant (Figure 1.0.7.2, pp. 25)

Average of the Average Percent Difference (D) - A data accuracy estimate, determined by weighted average of all the single analyzer quarterly average percent difference (d_j) for all audit test levels, for a single pollutant.

Mathematically:

$$D = \frac{n_1 d_1 + n_2 d_2 + ... + n_j d_j + ... + n_k d_k}{n_1 + n_2 + ... + ... + n_j + ... + n_k}$$

n = number of audits for each pollutant

Standard Deviation (S_a) - A measure of the weighted variability of all the single analyzer quarterly standard deviations (S_j) summed for k analyzers, for a single pollutant.

Mathematically:

$$S_a = \sqrt{\frac{(n_1 - 1)S_1^2 + (n_j - 1)S_j^2 + (n_k - 1)S_k^2}{n_1 + ...+ n_j + n_k - n_k - k}}$$

95 Percent Probability Limits - A measure of the upper and lower probability limits (UPL & LPL), of which one would expect to find 95 percent of all the single analyzer individual percent differences, at all audit test levels, for a single pollutant.

Mathematically for automated analyzers:

$$UPL_a = D + 1.96\ S_a$$
$$LPL_a = D - 1.96\ S_a$$

Mathematically for manual methods (i.e. PM10, TSP, Pb):

$$UPL_a = D + 1.96\ S_a / \sqrt{2}$$
$$LPL_a = D - 1.96\ S_a / \sqrt{2}$$

3. Quarterly/Annual Accuracy Report - By Audit Test Level (Figure 1.0.7.2, pg. 26).

Average Percent Difference (d_k) - A data accuracy estimate, determined by averaging all the single analyzer quarterly average percent difference at each audit test level, for a single pollutant.

Mathematically:

$$d_k = 1/k \sum_{i=1}^{k} d_i$$

k = number of audits performed at each audit test level

Standard Deviation (S_k) - A measure of the variability of all analyzers monitoring a single pollutant at a single audit test level.

Mathematically:

$$S_k = 1/(k-1) \sum_{i=1}^{k} d_i^2 - 1/k \left(\sum_{i=1}^{k} di \right)^2$$

95 Percent Probability Limits - A measure of the upper and lower probability limits (UPL & LPL), of which one would expect to find 95 percent of all the single analyzer individual percent differences, for a single pollutant.

Mathematically for automated analyzers:

$$UPL_k = d_k + 1.96\ S_k$$
$$LPL_k = d_k - 1.96\ S_k$$

Mathematically for manual methods (i.e. PM10, TSP, Pb):

$$UPL_k = d_k + 1.96\ S_k / \sqrt{2}$$
$$LPL_k = d_k - 1.96\ S_k / \sqrt{2}$$

1.0.7.5 PRECISION DATA COLLECTION

1. Air monitoring personnel perform analyzer precision tests by passing the test gas through filters, scrubbers, conditioners, or other components used during normal ambient sampling and as much of the ambient air inlet system as possible. CO analyzers may be temporarily modified during the precision test to reduce vent or purge flows, or the test atmosphere may enter the analyzer at a point other than the normal sample inlet, provided that the analyzer's response is not likely to be altered. Those CO analyzers equipped with automatic zero and span systems and sample pumps installed between the analyzer sample inlet and the manifold must have the precision test gas injected upstream of the pump and the automatic zero and span systems.

2. The precision tests are conducted prior to any zero and span adjustments.

3. Precision test data are reported to the QAS on standardized data forms.

4. On days the air quality data are deleted, the precision test data are also deleted.

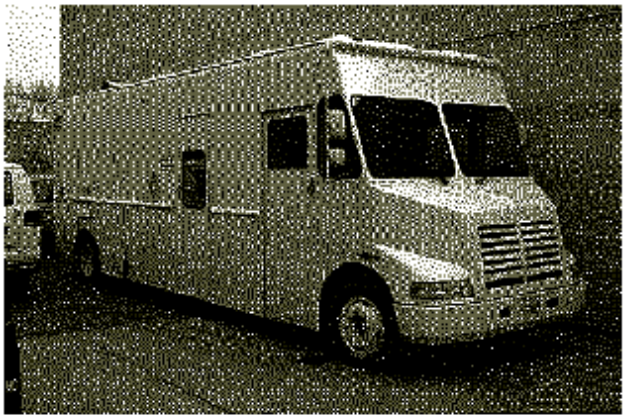
5. Working standards used for generating precision test gases are maintained using the ARB certification criteria.

1.0.7.6 DATA QUALITY PRECISION REPORTING FORM - QAS staff compiles data precision assessment reports submitted by AM/APCD staff.

1. U.S. EPA Data Quality Assessment Reporting Form (Figure 1.0.7.4) - As required by 40 CFR Part 58, staff complies the quarterly reports which contains individual precision tests results for sites within the ARB reporting organization. Within 100 days after the end of each calendar quarter, these reports are submitted to the U.S. EPA Region IX QA Coordinator. Some data are submitted on magnetic disk in accordance with the U.S. EPA recommended AQS format. U.S. EPA calculates the precision estimates for essentially the same parameters defined in Section 1.0.7.4.

California Air Resources Board
Preliminary Performance Audit Report
By
Quality Assurance Section
Monitoring and Laboratory Division

Manager: Michael Miguel **Phone: (916) 324-6191**



Chico-Manzanita Avenue Air Monitoring Station

Audit Date: 11/14/2000

Auditors:
Don Fitzell
Eric Albright

Station Operator:
Bob Land

Report Contents
Executive Summaries
Technical Appendixes
Site Survey Report

Figure 1.0.7.1
Preliminary Audit Report

Executive Summary - Gaseous Criteria

Air Monitoring Station: Chico-Manzanita Avenue Audit Date: 11/14/2000

Parameter	Audit Level	Station Ind. (ppm)	Van Act. (ppm)	Percent Diff.
Ozone	Low	.070	.070	**0.0%**
	Mid	.179	.178	**0.6%**
	High	.403	.400	**0.8%**

Average % Diff.	Standard Dev.	Correlation	Probability Limits Upper 95	Lower 95
0.5%	0.41633	1.00000	1.3	-0.3

Parameter	Audit Level	Station Ind. (ppm)	Van Act. (ppm)	Percent Diff.
Carbon Monoxide	Low	7.49	7.09	**5.6%**
	Mid	19.6	19.0	**3.3%**
	High	37.3	37.1	**0.6%**

Average % Diff.	Standard Dev.	Correlation	Probability Limits Upper 95	Lower 95
3.2%	2.50267	0.99994	8.1	-1.7

Parameter	Audit Level	Station Ind. (ppm)	Van Act. (ppm)	Percent Diff.
Nitrogen Dioxide	Low	.070	.066	**6.1%**
	Mid	.179	.168	**6.5%**
	High	.385	.363	**6.1%**

Average % Diff.	Standard Dev.	Correlation	Probability Limits Upper 95	Lower 95
6.2%	0.23094	1.00000	6.7	5.7

California Air Resources Board
Monitoring and Laboratory Division
Quality Assurance Section

Figure 1.0.7.1 (cont.)
Preliminary Audit Report

Executive Summary - Samplers (Flow Rate)

Air Monitoring Station: Chico-Manzanita Avenue Audit Date: 11/14/2000

Parameter	Station Ind.	Van Act.	**Percent Diff.**	**Percent Diff. from Design**
PM10	40.00	40.30	**-0.7%**	**0.8%**
TEOM Main	3.00	3.03	**-1.0%**	**1.0%**
TEOM Aux	13.66	13.50	**1.2%**	**-1.5%**
TEOM Total	16.66	16.40	**1.6%**	**-1.8%**
PM2.5	16.60	17.23	**-3.7%**	**3.4%**
TOTAL METAL	12.00	11.99	**0.1%**	
CR6	11.94	11.99	**-0.4%**	
ALDEHYDYES	0.70	0.66	**6.1%**	

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Monitoring and Laboratory Division
Quality Assurance Section

Figure 1.0.7.1 (cont.)
Preliminary Audit Report

Executive Summary - Meteorological Sensors

Air Monitoring Station: Chico-Manzanita Avenue Audit Date: 11/14/2000

Audit Parameter & Level	Station Ind.	Van Act.	Diff. or % Diff.
Ambient Temperature (Hot)	47.00	46.80	**0.20**
Ambient Temperature (Warm)	23.20	23.20	**0.00**
Ambient Temperature (Cold)	0.10	0.00	**0.10**
Relative Humidity (Level 1)	73.70	75.20	**-1.50**
Relative Humidity (Level 2)	52.20	49.70	**2.50**
Relative Humidity (Level 3)	24.60	23.50	**1.10**
Wind Direction (East)	88.00	90.00	**-2.00**
Wind Direction (South)	180.0	180.0	**0.00**
Wind Direction (West)	271.0	270.0	**1.00**
Wind Direction (North)	361.0	360.0	**1.00**
Wind Direction (High East)	449.0	450.0	**-1.00**
Horizontal Wind Speed (Level 1)	0.28	0.27	**0.01**
Horizontal Wind Speed (Level 2)	8.28	8.27	**0.12**
Horizontal Wind Speed (Level 3)	16.26	16.26	**0.00**
Horizontal Wind Speed (Level 4)	24.28	24.26	**0.08**
Horizontal Wind Speed (Level 5)	32.25	32.25	**0.00**
Barometric Pressure (Level 1)	758.0	762.0	**-4.00**
Barometric Pressure (Level 2)	758.0	762.0	**-4.00**
Barometric Pressure (Level 3)	758.0	762.0	**-4.00**

California Air Resources Board
Monitoring and Laboratory Division
Quality Assurance Section

Figure 1.0.7.1 (cont.)
Preliminary Audit Report

Site Survey Report

Siting Information

Site Name:	Chico-Manzanita Avenue	**Audit Date:**	11/14/2000	**Latitude:**	39 45'27"	**Site Report:**	Y
ARB Number:	04628	**Auditors:**	Don Fitzell	**Longitude:**	121 50'32"	**Site Photos:**	Y
AIRS Number:	060070002		Eric Albright	**Elevation:**	61 meters		
Agency:	California Air Resources Board	**Site Contact:**	Bob Land	**Site Phone:**	(530) 895-5156		

General Siting Conditions

Station Temperature **Controlled:** Y **Recorded:** Y **Inside:** 25 Degrees Celsius	**Traffic** **Description:** Hwy. 99 **Distance:** 500 meters **Count:** 31500	**Dominate Influence** **Category:** Vehicular **Topography** **Site:** Level **Region:** Level	**QA Plan:** Y **Air Flow Arc:** 360 Degrees	**Probe/Man. Clean:** Y **Schedule:** Semi Annually **Autocalibrator Type:** Environics 9100
Meteorology **Collocated:** Y **Shadowing:** N **Boom Orientation:** N/S **Temp. Rad. Shield Asp.:** Motor	**Non-vehicular Local Sources** **Description:** None **Distance:** 0 meters **Direction:**	**Urbanization:** Suburban **Ground Cover:** asphalt	**Site Survey Complete:** Y **Logbook Up to Date:** Y **QA Manual** **Approved:** Y **Agency:** Air Resources Board	

Action Items

- Ground Cover: Aqu=Aquaduct. The site is located next to an aquaduct.

Quality Assurance Section **Page 1 of 3**

Figure 1.0.7.1 (cont.)
Preliminary Audit Report

Site Survey Report (Cont'd)

	Instrument Type	Purpose	Objective	Scale	Height Above		Sampler Spacing	Manual Available	Inst. Log Maint'd & Avail.	In Line Filter Change Date	Cal. Gas Cert. Date
					Ground	Platform					
O3	API 400	SLAMS	Representative	Neighborhood	6.6	2.8	N/A	Y	Y	11/13/1900	N/A
SO2											
NO2	TECO 42	SLAMS	Representative	Neighborhood	6.6	2.8	N/A	Y	Y	11/13/1900	04/30/1900
CO	DASIBI 3008	SLAMS	Representative	Neighborhood	6.6	2.8	N/A	Y	Y	11/13/1900	04/30/1900
H2S											
CH4											
THC											
NMHC											
PM10	ANDERSEN 1200	SLAMS	Representative	Neighborhood	5.3	1.6	0.0	Y	Y	N/A	N/A
PM10 Colloc.											
PM2.5	R&P 2000	SLAMS	Representative	Neighborhood	5.8	2.1	0.0	Y	Y	N/A	N/A
PM2.5 Colloc.											
PM2.5 Spec.											
TSP											
TSP Colloc.											
Lead											
Dichot											
TEOM	R&P 1400A	N/A	Representative	Neighborhood	5.2	2.0	0.0	Y	Y	N/A	N/A
BAM											
Temp	MET ONE 060A-2	N/A	N/A	N/A	5.6	2.9	N/A	Y	Y	N/A	N/A
%RH	MET ONE 083D-0-	N/A	N/A	N/A	5.6	2.9	N/A	Y	Y	N/A	N/A
Baro	MET ONE 090D-28	N/A	N/A	N/A	5.6	2.9	N/A	Y	Y	N/A	N/A
WS HORIZ.	MET ONE 010C	N/A	N/A	N/A	10.0	6.3	N/A	Y	Y	N/A	N/A
WS VERTICAL											
WD	MET ONE 010C	N/A	N/A	N/A	10.0	6.3	N/A	Y	Y	N/A	N/A
Solar											
Rain Gauge											
Toxics 920	XONTECH 920	N/A	N/A	N/A	5.0	1.3	N/A	Y	Y	N/A	N/A
Carbonyl 925											
NMOC 910											
Wet/Dry Acid											
AISI Tape											
Nephelometer											

Figure 1.0.7.1 (cont.)
Preliminary Audit Report

Site Survey Report (Cont'd)

	Calibration		Cal. Equip. Cert. Date	Description of Obstacle	Dist./Direct. to Obstacle	Height above Inlet	Distance to Walls, etc.	Distance to Dripline	Residence Time
	Current	Cal. Date							
O3	Y	07/05/1900	03/03/1900	None	n/a				18.0
SO2									
NO2	Y	07/05/1900	03/03/1900	None	n/a				19.1
CO	N	11/15/1900	03/03/1900	None	n/a				16.4
H2S									
CH4									
THC									
NMHC									
PM10	Y	09/05/1900	06/27/1900	None					N/A
PM10 Colloc.									
PM2.5	Y	06/07/1900	02/01/1999	None					N/A
PM2.5 Colloc.									
PM2.5 Spec.									
TSP									
TSP Colloc.									
Lead									
Dichot									
TEOM	Y	03/31/1999	01/27/1999	None	n/a				N/A
BAM									
Temp	Y	06/09/1900	12/23/1999	None			N/A	N/A	N/A
%RH	Y	06/09/1900	02/18/1999	None			N/A	N/A	N/A
Baro	Y	06/09/1900	09/07/1999	None			N/A	N/A	N/A
WS HORIZ.	Y	06/09/1900	06/24/1999	None			N/A	N/A	N/A
WS VERTICAL									
WD	Y	06/09/1900	/ /	None			N/A	N/A	N/A
Solar									
Rain Gauge									
Toxics 920	Y	06/07/1900	04/21/1900	None					N/A
Carbonyl 925									
NMOC 910									
Wet/Dry Acid									
AISI Tape									
Nephelometer									

Figure 1.0.7.1 (cont.)
Preliminary Audit Report

Air Quality Data Accuracy Estimates

Gaseous Audit Results - All

Parameter	# of Audits	Avg % Diff.	Std. Dev.	95% UL	95% LL
OZONE	147	-2.5	3.7	4.8	-9.8
CARBON MONOXIDE	63	0.6	3.8	8.0	-6.8
SULFUR DIOXIDE	27	-1.2	4.8	8.1	-10.5
NITROGEN DIOXIDE	85	-3.3	4.3	5.2	-11.8
HYDROGEN SULFIDE	8	2.4	5.3	12.9	-8.1
METHANE	22	-1.1	5.2	9.0	-11.2
TOTAL HYDROCARBONS	15	1.3	8.4	17.7	-15.1
METHANE SB3	7	-5.0	3.6	2.1	-12.1
TOTAL HYDROCARBONS SB3	2	-2.9	1.9	0.8	-6.6
TOTAL NMOC SB3	11	-1.3	4.7	7.9	-10.5

Air Quality Data Accuracy Estimates

Particulate Audit Results - All

Parameter	# of Audits	Avg % Diff.	Std. Dev.	95% UL	95% LL
DICHOT	18	0.1	4.2	8.4	-8.2
TEOM	33	-1.4	2.9	4.4	-7.2
PM10 TOTAL 0-10UM	143	-0.3	3.1	5.9	-6.5
TOTAL SUSPENDED PARTICULATE	15	-1.5	4.8	7.9	-10.9
LEAD (TSP)	17	0.0	4.3	8.4	-8.4
BAM	3	-5.2	5.3	5.2	-15.6
PM2.5	93	-1.1	1.9	2.6	-4.8
PM10 PARTISOL	4	-3.1	2.8	2.5	-8.7

Air Quality Data Accuracy Estimates

Meteorological Audit Results - All

Parameter	# of Audits	Avg Diff.	Std. Dev.	95% UL	95% LL
OUTDOOR TEMPERATURE	78	0.0	0.2	0.5	-0.5
RELATIVE HUMIDITY	11	7.2	15.7	38.1	-23.7
WIND DIRECTION	83	-0.4	2.2	3.9	-4.7
VERTICAL WIND SPEED	7	0.0	0.1	0.2	-0.2
WIND SPEED	82	0.4	1.5	3.4	-2.6
BAROMETRIC PRESSURE	20	0.9	2.6	5.9	-4.1
SOLAR RADIATION	1	9.7	0.7	11.1	8.3

Figure 1.0.7.2
Final Audit Report

1999 Audit Distribution

1,063 Audits (after 49 AQDA deletions)

Instrument	# of Audits	% of Total Audits
O_3	147	13.8%
CO	63	5.9%
SO_2	27	2.5%
NO_2	85	8.0%
H_2S	8	0.8%
CH_4	22	2.1%
THC	15	1.4%
CH_4 (Hex)	7	0.7%
THC (Hex)	2	0.2%
Total NMOC	11	1.0%
Dichot	18	1.7%
TEOM	33	3.1%
PM_{10}	143	13.5%
TSP	15	1.4%
Pb	17	1.6%
BAM	3	0.3%
$PM_{2.5}$	93	8.7%
PM_{10} Partisol	4	0.4%
Ambient/Outdoor Temperature	78	7.3%
Relative Humidity	11	1.0%
Wind Direction	83	7.8%
Vertical Wind Speed	7	0.7%
Horizontal Wind Speed	82	7.7%
Barometric Pressure	20	1.9%
Solar Radiation	1	0.1%
PAMS (TTP)	17	1.6%
PAMS (Lab)	8	0.8%
Carbonyl	6	0.6%
Motor Vehicle Exhaust (Lab)	4	0.4%
Toxics Metals (Flow)	13	1.2%
Toxics (TTP)	16	1.5%
Toxics (Lab)	2	0.2%
Toxics Metals (Lab)	2	0.2%

Figure 1.0.7.2 (Cont.)
Final Audit Report

Table 12
1999 AQDAs by Agency

AGENCY CODE	AGENCY	# of AQDAs	#of Inst Audited*	#of Deletions	% of Inst Deleted
001	ARB	21	410	10	2%
009	Imperial County APCD	3	15	3	20%
013	Sacramento Metropolitan AQMD	6	58	5	9%
014	Mojave Desert AQMD	1	43	0	0%
019	Ventura County APCD	6	54	6	11%
022	Great Basin Unified APCD	2	50	1	2%
029	Mendocino County APCD	1	12	0	0%
032	Northern Sonoma County APCD	1	7	1	14%
033	Placer County APCD	1	7	1	14%
035	San Luis Obispo County APCD	1	25	0	0%
036	San Diego County AQMD	3	13	0	0%
037	Shasta County APCD	2	6	2	33%
050	North Coast Unified AQMD	1	5	0	0%
051	Northern Sierra AQMD	5	16	4	25%
061	South Coast AQMD	10	104	6	6%
069	San Joaquin Valley Unified APCD	7	85	6	7%
071	Antelope Valley APCD	2	10	0	0%
076	SEMARNAP (Mexico)	4	61	4	7%

** # of instruments audited includes instruments deleted*

Figure 1.0.7.2 (cont.)
Final Audit Report

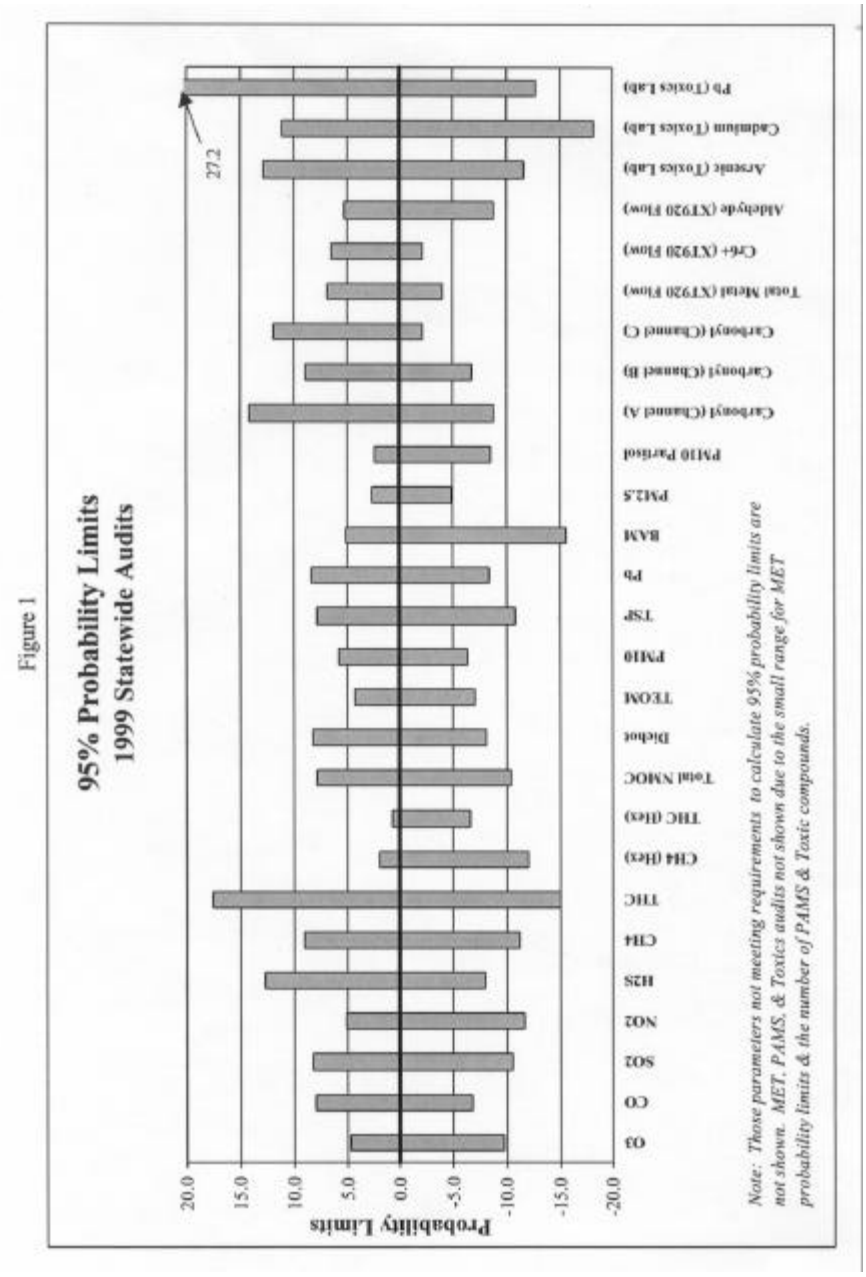

Figure 1.0.7.2 (Cont.)
Final Audit Report

MET Sensors Meeting PSD Standards

Pollutant/Sensor	# of Audits	# Meeting PSD Guidelines	% Meeting PSD Guidelines
Ambient Temp	78	76	97%
Relative Humidity	11	0	0%
Wind Direction	83	74	89%
Vert Wind Speed	7	6	86%
Horiz Wind Speed	82	75	91%
Barometric Pressure	20	20	100%
Solar Radiation	1	0	0%
Totals	282	251	89%

Figure 3
MET Audit Results

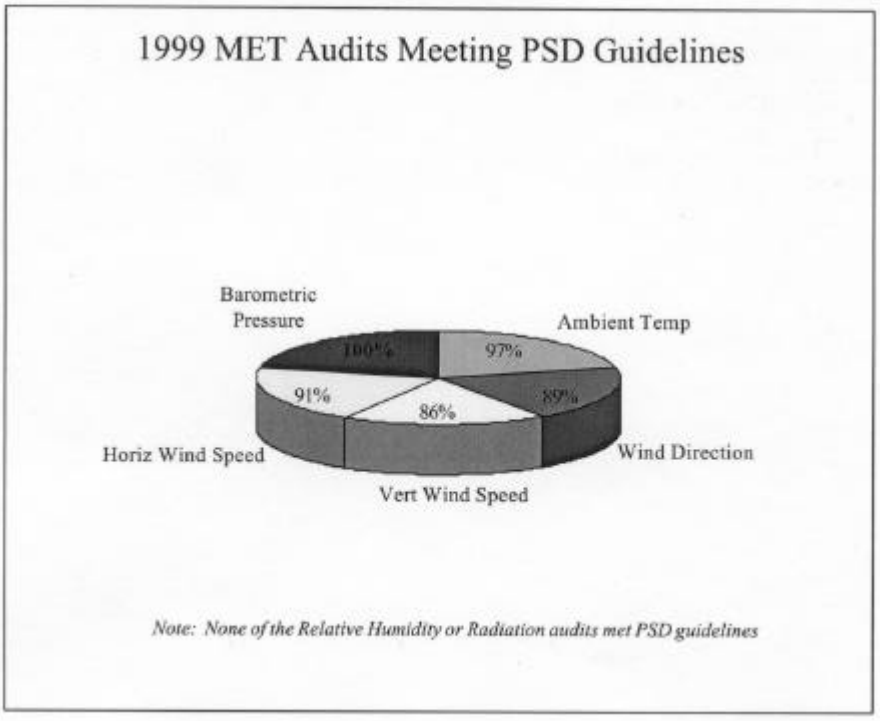

Figure 1.0.7.2 (Cont.)
Final Audit Report

Quality Assurance Thru-the-Probe Toxic VOC Audit Technical Appendix

Instrument/AIRS Information

ARB Number 31822 AIRS Number 060610006

Audit Date 01/14/99 Laboratory CALIFORNIA AIR RESOURCES BOARD

Audit Concentration Calculations

Diluted Conc. (ppbC) = True Conc. * Dilution Ratio

Percent Difference = (Average - Diluted Conc.)*100/Diluted Conc.

Audit Concentation versus Laboratory Response Data

Compound	True Conc. (ppbC)	Dilution Ratio	Diluted Conc. (ppbC)	Run 1 (ppbC)	Run 2 (ppbC)	Run 3 (ppbC)	Average (ppbC)	Percent Difference
Dichloromethane	764.00	1/101	7.56	8.51			8.51	*12.6%*
Chloroform	22.20	1/101	0.22	0.23			0.23	*4.5%*
1,1,1 Trichloroethane	265.00	1/101	2.62	2.68			2.68	*2.3%*
Carbon Tetrachloride	16.80	1/101	0.17	0.16			0.16	*-5.9%*
Benzene	261.00	1/101	2.58	2.80			2.80	*8.5%*
Trichloroethylene	92.20	1/101	0.91	1.09			1.09	*19.8%*
Toluene	514.00	1/101	5.09	4.50			4.50	*-11.6%*
Tetrachloroethylene	73.60	1/101	0.73	0.64			0.64	*-12.3%*
Chlorobenzene	90.80	1/101	0.90	0.60			0.60	*-33.3%*
Ethylbenzene	378.00	1/101	3.74	2.10			2.10	*-43.9%*
meta/para-Xylene	708.00	1/101	7.01	2.60			2.60	*-62.9%*
ortho-Xylene	85.10	1/101	0.84	0.30			0.30	*-64.3%*
Styrene	74.00	1/101	0.73					
m-Dichlorobenzene	132.00	1/101	1.31					
o-Dichlorobenzene	109.00	1/101	1.08					
1,2 Dibromomethane	15.30	1/101	0.15	0.18			0.18	*20.0%*
tert-Butyl methyl ether	293.00	1/101	2.90	2.70			2.70	*-6.9%*

California Air Resources Board
Monitoring and Laboratory Division
Quality Assurance Section

Figure 1.0.7.3
Toxics Through-the-Probe Audit Report

DATA PRECISION REPORT
DATA QUALITY ASSESSMENT REPORTING FORM

PRECISION

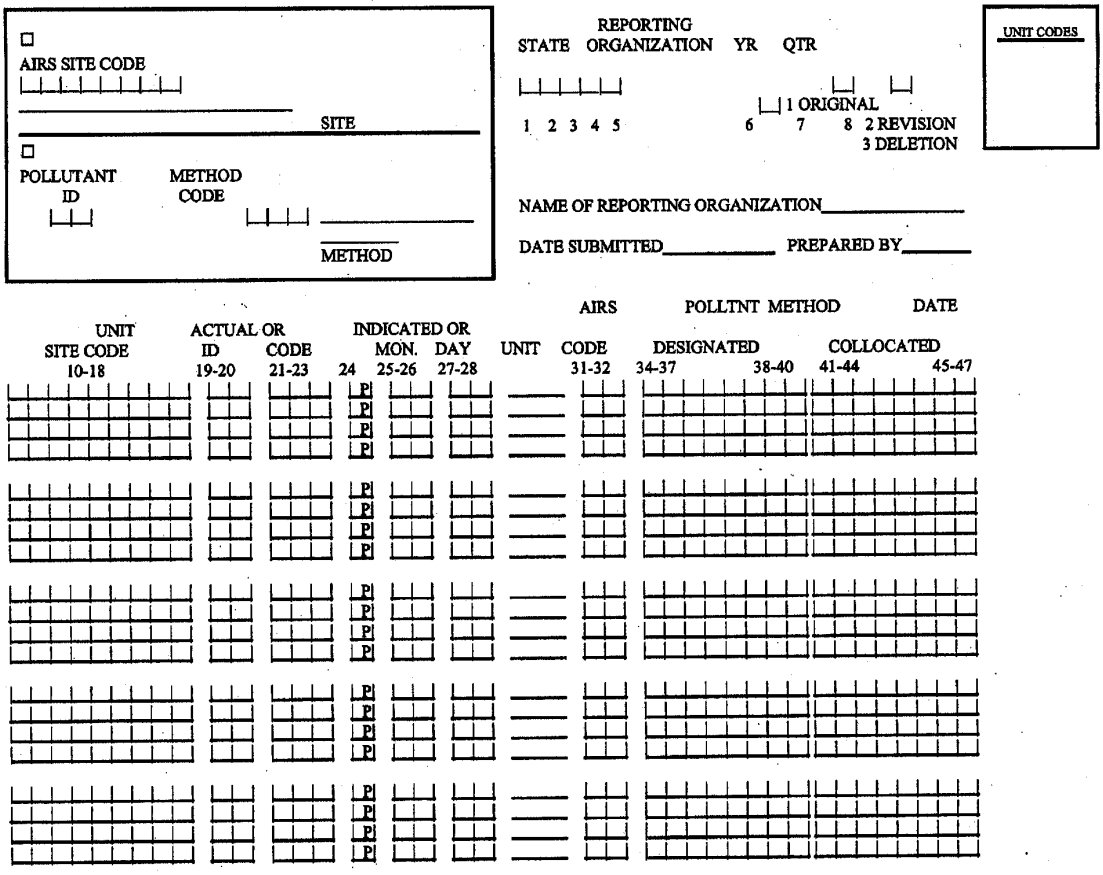

Figure 1.0.7.4
U.S. EPA Data Quality Assessment Reporting Form

Quality Assurance Agency Designation Codes

AGENCY CODE	AGENCY
001	California ARB
002	California Institute of Technology
003	Long Beach Department of Public Health
004	Bay Area AQMD
005	Needles City Hall
006	El Dorado County APCD
007	Fresno County APCD
008	Glendale Department of Public Service
009	Imperial County APCD
010	Los Angeles County APCD
011	Monterey Bay Unified APCD
013	Sacramento County APCD
014	Mojave Desert AQMD
015	San Francisco Health Department
016	San Joaquin County APCD
017	Santa Barbara County APCD
018	Santa Clara County Health Department
019	Ventura County APCD
020	Yolo-Solano APCD
021	Butte County APCD
022	Great Basin Unified APCD
023	Humboldt County APCD
024	Kern County APCD
025	Kings County APCD
026	Lake County APCD
027	Lassen County APCD
028	Madera County APCD
029	Mendocino County APCD
030	Merced County APCD
031	Modoc County APCD
032	Northern Sonoma County APCD
033	Placer County APCD
034	Riverside County APCD
035	San Luis Obispo County APCD
036	San Diego County AQMD
037	Shasta County APCD
038	Siskiyou County APCD
039	Stanislaus County APCD
040	Sutter County APCD
041	Tehama County APCD
042	Tulare County APCD
043	Toulumne County APCD
044	Yuba County APCD
045	Cool Water Coal Gasification Programs
046	Enviromental Monitoring Company (EMC)
047	Environmental Research Foundation
048	Pacific Gas and Electric (PG&E)
049	University of California-Riverside
050	North Coast Unified AQMD
051	Northern Sierra AQMD
052	XonTech, Inc.
053	Glenn County APCD
054	Amador County APCD
055	Calaveras County Health Departm
056	Colusa County APCD
057	Mariposa County APCD
058	Tracer Technologies
059	UNOCAL
060	TEXACO
061	South Coast AQMD
062	Chevron
063	Vandenberg AFB
064	EXXON
065	ERCE
066	ARCO
067	Shell
068	Feather River AQMD
069	San Joaquin Valley Unified APCI
070	POPCO
079	ATC
071	Antelope Valley APCD
073	WestSide Operators
076	SEMARNAP (Mexico)
077	OGDEN Engineering Systems
078	Desert Research Institute (DRI)
	USEPA Atmospheric Research ar
800	Assessment Lab
809	US EPA - Region IX
	US EPA/Human Studies Lab/Hea
812	Research Div
815	National Park Service (NPS)
819	US Forest Service
821	US EPA/OAQPS/MRB
908	Radian Corporation
909	Dames and Moore

Figure 1.0.7.5
Designation Codes

1.0.7.7 DATA ASSESSMENT CRITERIA FOR METEOROLOGICAL PARAMETERS

The QAS uses the criteria described below to determine the accuracies of various meteorological sensors. According to U.S. EPA Prevention of Significant Deterioration (PSD) Guidelines, accuracies and allowable errors for meteorological sensors are expressed as absolute errors for digital systems; errors in analog systems may be 50 percent greater. Audit results are currently described as meeting or not meeting the PSD guidelines listed below.

1. Horizontal Wind Speed and Wind Direction - Sensors should exhibit a starting threshold speed less than or equal to 0.5 meters per second (m/s) wind speed (at 10 degrees deflection for direction vanes). Wind speed sensors should be accurate above the starting threshold (0.5 m/s) to within 0.25m/s at speeds equal to or less than 5.0 m/s. At higher speeds, the error should not exceed 5 percent of the observed speed (maximum error not to exceed 2.5 m/s). The damping ratio of the wind vane should be between 0.4 and 0.65 and the distance constant should not exceed 5 meters. The error for wind direction sensors should not exceed 5 degrees, including sensor orientation error.

2. Vertical Wind Speed - Vertical wind speed sensors should exhibit a starting threshold speed less than or equal to 0.25 m/s. The required accuracy should be the same as horizontal wind speed.

3. Ambient Temperature - Errors should not exceed 1.0°C. If fog formation is a problem, errors should not exceed 0.5°C.

4. Humidity - Percent relative humidity values are converted to dew point temperature for error calculation. Errors in dewpoint temperature should not exceed 1.5°C over a dewpoint range of -30 to +30°C. If fog formation is significant, the error should not exceed 0.5°C.

1.0.7.8 DATA ASSESSMENT CRITERIA FOR BAM AND TEOM MONITORS

AQSB is currently performing quality control flow checks and comparisons of BAM and TEOM data against SSI/dichots for outliers. Further, the following interim procedures should be used for SLAMS and NAMS monitoring networks, as a part of and consistent with other data quality assessment requirements specified in 40 CFR 58, Appendix A.

1. General Quality Assurance - Quality assurance procedures described in the Operation or Instruction manual associated with each method should be implemented as completely as feasible. The use of calibration foils or standard filters is encouraged to the extent possible. Special care should be given to checking and recording the operational parameters of the instruments, since it may not be possible to verify these parameters in data output reports to printers or data processing systems.

2. Precision Assessment - Carry out a one-point check of each PM10 analyzer's normal operating flow rate at least once every two weeks using a flow rate transfer standard as described in Section 2.3.3 of Part 58, Appendix A.

   Care should be used in measuring the flow rate so that the flow measurement device does not alter the normal operating flow rate of the analyzer. If a precision check is made in conjunction with a zero or span adjustment, it must be made prior to such zero and span adjustment. Randomization of the precision check with respect to time of day, day of week, and routine service and adjustments is encouraged where possible.

   Report actual analyzer flow rate measured by the transfer standard and the corresponding flow rate measured or assumed by the analyzer. The percent differences between these flow rates are used to assess the precision of the monitoring data as described in Section 5.1 of Volume II of the U.S. EPA Quality Assurance Handbook, Appendix A (using flow rates in lieu of concentrations).

3. Accuracy Assessment - Each calendar quarter, audit the flow rate of at least 25 percent of the SLAMS PM10 analyzers such that each analyzer is audited at least once per year. If there are fewer than four PM10 analyzers within a reporting organization, randomly reaudit one or more analyzers so that at least one analyzer is audited each calendar quarter. Where possible, U.S. EPA strongly encourages more frequent auditing, up to an audit frequency of once per quarter for each SLAMS analyzer.

   The audit is made by measuring the analyzer's normal operating flow rate, using a flow rate transfer standard as described in Section 2.3.3 of Part 58, Appendix A. The flow rate standard used for auditing must not be the same

flow rate standard used to calibrate the analyzer. However, both the calibration standard and the audit standard may be referenced to the same primary flow rate or volume standard. Great care must be used in auditing the flow rate to be certain that the flow measurement device does not alter the normal operating flow rate of the analyzer. Report the audit flow rate and the corresponding flow rate indicated or assumed by the sampler. The percent difference between these flow rates are used to calculate accuracy as described in Section 5.4.1 of Volume II of the U.S. EPA Quality Assurance Handbook, Appendix A.

Portions of the guidance on flow rate standard devices and flow rate checks and audits for dichotomous PM10 samplers given in Section 2.10 of the U.S. EPA Quality Assurance Handbook, Volume II (EPA 600/4-77-027a) are applicable to the continuous PM10 analyzers. Copies of Section 2.10 can be obtained from the Aerosol Physics and Methods Branch or may be downloaded (without figures) from the AMTIC electronic bulletin board. For the TEOM, the actual instrument flow rate (nominally 3.0 liters/min) should be measured and reported for precision and accuracy. The total flow rate (nominally 16.7 liters/min) should be checked to verify that it is within the $\pm$10 percent tolerance specified for the PM10 inlet, but total flow rates should not be reported for precision or accuracy. Also, results from accuracy audits using calibration foils or standard filters should not be reported for accuracy until definitive procedures are established.

1.0.7.9 DATA ASSESSMENT CRITERIA FOR AMBIENT TOXICS DATA

Field performance audits of the XonTech 920 Toxic Air Sampler are conducted annually by QAS staff. The purpose of the audit is to assure the flow accuracy of each sampling channel in the sampler. The audit is conducted by comparing the indicated flow on each sampling channel against the true flow as measured by a certified flow transfer standard. The audit procedure is detailed in Appendix L of Volume V of the QA Manual. Flow limits are $\pm$10 percent.

Laboratory performance audits of the Toxic Air Contaminants (TAC) Program are performed semiannually by QAS staff. The purpose of the audits is to assess the accuracy of the methods used by the laboratories to measure ambient concentrations of TACs. The audits are conducted by supplying each laboratory with a cylinder containing a mixture of standards certified by NIST. The laboratory analyzes the contents of the cylinder following standard operating procedures, and reports the results

of the analyses to QAS. QAS, in turn, calculates the percent biases of the results and reports the final audit results to the laboratory. Control limits on percent biases depend on the individual compound measured and can vary from ±10 percent to ±50 percent. The list of TACs that may be in the audit cylinders is contained in the audit procedure, Appendix M of Volume V of the QA Manual.

Field performance audits of the XonTech 910A Toxic Air Sampler are conducted annually by QAS staff by collecting known concentrations of TACs (using a NIST cylinder and diluting to ambient concentrations) through-the-probe into Summa canisters. The purpose of the audits is to assess the accuracy of the total measurement system, including laboratory error. The laboratory analyzes the contents of the canister and reports the results to QAS. QAS then calculates the percent differences and reports the final results to the laboratory. The control limits on percent differences have not yet been established. The list of TACs contained in the canister is shown in Figure 1.0.7.3.

1.0.7.10 DATA ASSESSMENT CRITERIA FOR NON-METHANE HYDROCARBONS IN AMBIENT AIR

Laboratory performance audits of the non-methane hydrocarbons program are performed annually by the QAS staff. The purpose of the audits is to assess the accuracy of the methods used by the laboratories to measure ambient concentration of non-methane hydrocarbons. The audits are conducted by supplying each laboratory with a cylinder containing a mixture of standards certified by the National Institute of Standards and Technology (NIST). The laboratory analyzes the contents of the cylinder following standard operating procedures, and reports the results of the analyses to QAS. QAS, in turn, calculates the percent differences of the results and reports the final audit results to the laboratory. Control limits on percent biases are ±20 percent.

Field performance audits of the NMHC program are conducted annually by QAS staff by collecting known concentrations of NMHCs (using NIST cylinder and diluting to ambient concentrations) through-the-probe into Summa canisters. The purpose of the audits is to assess the accuracy of the total measurement system, including laboratory error. The laboratory analyzes the contents of the canister and reports the results to QAS. QAS, in turn, calculates the percent biases and reports the final results to the laboratory. The control limits on percent bias have been set at ±20 percent for each compound.

1.0.7.11 DATA ASSESSMENT CRITERIA FOR NON-METHANE HYDROCARBONS IN MOTOR VEHICLE EXHAUST

Laboratory performance audits of the NMHC motor vehicle exhaust program are performed annually by the QAS. The purpose of the audits is to assess the accuracy of the methods used by Southern Laboratory Branch to measure the concentrations of non-methane hydrocarbons. The audits are conducted by supplying each laboratory with a cylinder containing a mixture of standards certified by NIST. The laboratory analyzes the contents of the cylinder following standard operating procedures, and reports the analyses results to QAS. QAS, in turn, calculates the percent differences of the results and reports the final audit results to the laboratory. Control limits on percent differences are $\pm$20 percent for each compound.